



# Supply Chain Performance Analysis Report

Supply Chain Data Analytics System

September 2025

---

## 1. Project Overview

This project aimed to build an **end-to-end data analytics system for supply chain management** using automation and AI-driven analysis. The system streamlined data collection, storage, and visualization to help in **tracking KPIs and generating actionable business insights**.

---

## 2. Objectives

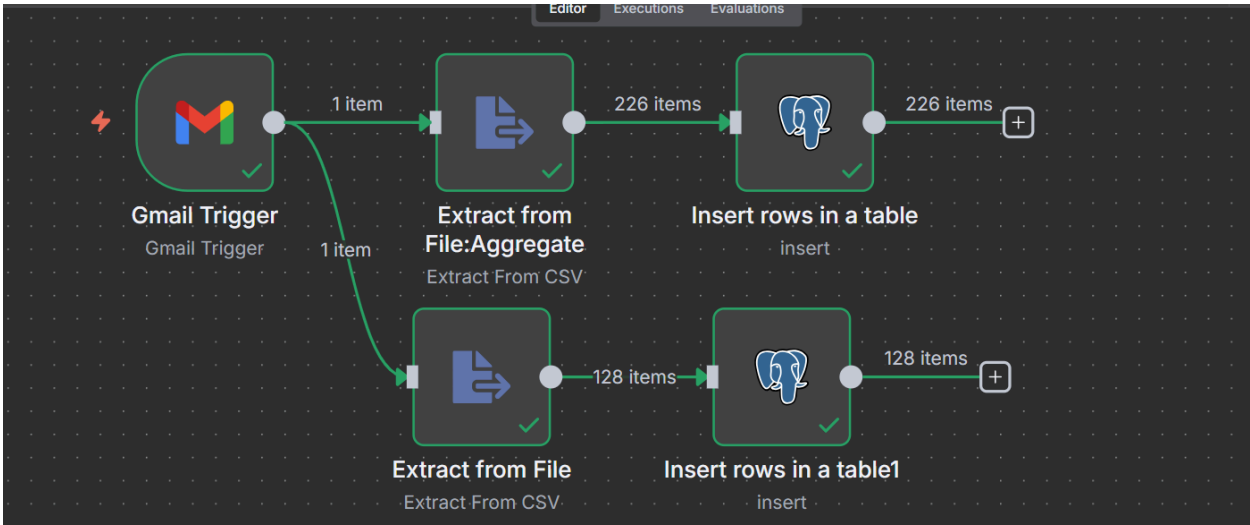
- Automate sales data extraction from emails.
  - Store and organize data in a centralized database (PostgreSQL on Supabase).
  - Enable natural language queries for easy analysis.
  - Calculate key supply chain metrics (LFR, VFR, OTIF).
  - Generate insights for monthly performance and customer trends.
- 

## 3. System Architecture

Workflow:

1. **Data Ingestion:** Sales CSV files extracted from emails using **n8n automation**.
2. **Database Management:** Cleaned and stored in **PostgreSQL hosted on Supabase**.

- 3. **AI-Powered Analysis:** Connected to AI-driven spreadsheet for query-based analysis.
- 4. **KPI Calculation:** Computed Line Fill Rate, Volume Fill Rate, OTIF.
- 5. **Insight Generation:** Produced monthly performance reports and customer segmentation.



4.Executive Summary

This analysis evaluates the supply chain performance using customer-level, regional, and overall KPI data. While the system successfully processes high volumes of orders, performance gaps exist in order fulfillment and delivery reliability. The most critical issue identified is the **low On-Time In-Full (OTIF) rate of 47.84%**, indicating significant room for improvement in both timeliness and completeness of deliveries.

5.KPI Performance Analysis

KPI	Value	Interpretation
Total Order Lines	24,195	High order complexity with many SKUs per order.
Total Orders	13,467	Large customer base, multiple SKUs per order.

<b>Line Fill Rate</b>	65.93%	Only two-thirds of order lines are fulfilled correctly; missing items are frequent.
<b>Volume Fill Rate</b>	96.60%	Bulk quantities are mostly fulfilled; a major issue lies in SKU-level fulfillment.
<b>On-Time Delivery %</b>	71.21%	Almost 3 out of 10 orders are delivered late.
<b>In-Full Delivery %</b>	65.93%	Around 1/3 of orders are delivered incomplete.
<b>OTIF %</b>	47.84%	Less than half of orders are delivered both on time and complete. <b>Critical gap.</b>

#### Insight:

Bulk shipments are reliable, but accuracy at the SKU level and timeliness are poor, leading to a negative customer experience.

---

## 6.Customer-Level Insights

Customer	Total Order Value	OT %	IF %	OTIF %	Key Takeaway
Lidl	\$24.88M	24.44 %	74.72 %	19.21%	Severe delays; customer experience risk.
Foodtown	\$24.75M	81.98 %	72.49 %	57.45%	Decent performance, but fill rates need attention.

Whole Foods Market	\$24.31M	82.63 %	75.00 %	62.01%	Strongest performer; relatively reliable.
Price Rite	\$24.05M	83.67 %	28.61 %	23.12%	Poor fill rate, high stock-out risk.
Wegmans	\$23.42M	84.91 %	72.70 %	61.93%	Stable performance, but improvements possible.

#### Insights:

- **Whole Foods Market and Wegmans** are the best-performing accounts.
- **Lidl and Price Rite** are underperforming, with OTIF below 25%, which can damage long-term partnerships.

---

## 7. Regional Insights

Region	Total Order Value	OT %	IF %	OTIF %	Key Takeaway
New Jersey, US	\$25.51M	73.49 %	66.32 %	49.82%	Major market, but only ~50% OTIF.
Ahmedabad	\$20.79M	70.40 %	67.44 %	48.44%	Consistent delays; below target OTIF.
Vadodara	\$20.50M	69.91 %	64.02 %	45.36%	Lowest OTIF region, urgent improvement needed.

#### Insights:

- All regions are **below the 85% OTIF benchmark** (common in FMCG supply chains).
  - Regional performance is consistently weak, suggesting systemic issues in planning, logistics, or supplier coordination.
- 

## 8. Strategic Recommendations

### Short-Term Improvements

1. **Enhance Picking & Packing Accuracy** → Introduce barcode scanning and AI-based validation to reduce SKU-level errors.
2. **Fast-Track High-Value Customers** → Dedicated lanes for Whole Foods, Wegmans, and other top accounts.
3. **Delivery Prioritization** → Prioritize shipments flagged as at-risk of delay.

### Long-Term Strategy

1. **Demand Forecasting & Inventory Optimization** → Leverage predictive analytics to ensure right stock levels.
2. **Supplier Performance Monitoring** → Track and manage supplier delivery reliability.
3. **Process Automation** → Use n8n workflows with AI to proactively flag orders likely to miss OTIF.

## 9. Technologies Used

- **n8n** → Workflow automation (email to DB pipeline).
- **PostgreSQL (Supabase)** → Cloud-hosted relational database.
- **AI Spreadsheet** → Natural language data analysis.

## 10. Conclusion

The current supply chain is handling **large volumes efficiently in terms of bulk shipments** but faces challenges in **accuracy and timeliness**. Improving **OTIF performance** should be the top priority. By adopting automation, predictive analytics, and customer-focused strategies, the organization can significantly enhance supply chain excellence and strengthen its competitive advantage in global FMCG markets.